

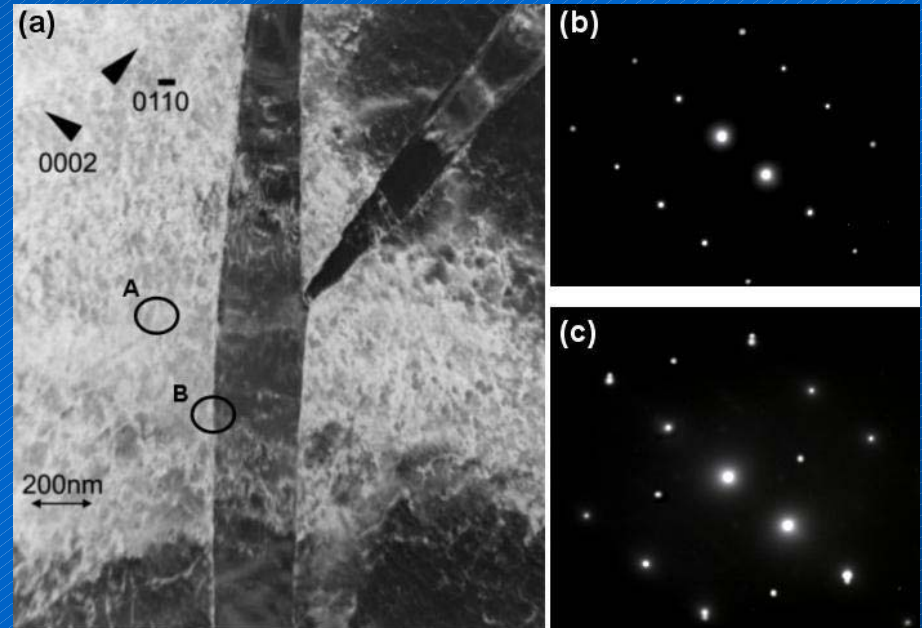
Determination of Activation Energies and Modeling of Low Temperature Creep of Alpha, Alpha-Beta, and Beta Titanium Alloys

S. Ankem, FASM, University of Maryland, College Park, DMR # 0102320

Introduction

- Titanium alloys are used in a wide range of applications, from aerospace to biomedical
- Time dependent deformation, ie creep at room temperature is an important factor
- This concern must be addressed in order to design new high performance titanium alloys

Some applications of titanium alloys:



TEM analysis of creep mechanisms in α -Ti-1.6V alloy:

- (a) $\{10\bar{1}2\}$ type deformation twins
- (b) Diffraction pattern of matrix
- (c) Diffraction pattern of twin-matrix interface

Determination of Activation Energies and Modeling of Low Temperature Creep of Alpha, Alpha-Beta, and Beta Titanium Alloys

S. Ankem, FASM, University of Maryland, College Park, DMR # 0102320

Education

Four graduate students, Allan Jaworski, Greg Oberson, Chinmay Gowardhan and Sharon Grant, are being trained under this grant in both experimental and theoretical studies. The students are working with α , β , and α - β titanium alloys. Experimental methods include electron microscopy and mechanical testing. Upon completion, these students are expected to take up positions as scientists/engineers in government or industry.

Outreach

The results of this investigation are made available to the general public through presentation at national and international conferences and publication in archival journals. For example:

- The paper “Ambient Temperature Creep Deformation Behavior of an α -Ti-1.6 wt.% V Alloy” was presented at the Tenth World Conference on Titanium in Hamburg, Germany in July 2003.
- The paper “The Effect of Grain Size and Stability on Ambient Temperature Tensile and Creep Deformation in Metastable Beta Titanium Alloys” was published in the journal, *Acta Materialia* in 2003.